5. The synthetic oligonucleotide of claim 1, wherein the DCMTase is from a mammal, bird, fish, amphibian, reptile, insect, plant or fungus.

6. The synthetic oligonucleotide of claim 5, wherein the mammal is selected from the group consisting of mouse and human.

7. The synthetic oligonucleotide of claim 1 having an inhibition constant of not greater than 1000 nM.

8. The synthetic oligonucleotide of claim 7 having an inhibition constant of not greater than 200 nM.

9. The synthetic oligonucleotide of claim 8 having an inhibition constant of not greater than 20 nM.

10. The synthetic oligonucleotide of claim 1 comprising a nucleotide sequence as shown in Figure 1B and designated GC-box b^{MET} (SEQ ID NO:10), GC-box p^{MET} (SEQ ID NO:10), GC-box c^{MET} (SEQ ID NO:13), GC-box d^{MET} (SEQ ID NO:14), GC-box e^{MET} (SEQ ID NO:15), or CRE a^{MET} (SEQ ID NO:11).

11. A method of inhibiting methylation of DNA comprising contacting a DCMTase with a synthetic inhibitor molecule so as to form an enzyme/synthetic inhibitor molecule complex in the presence of the DNA, wherein the synthetic inhibitor molecule comprises a C-5 methylcytosine which recognizes and binds an allosteric site on DCMTase, thereby inhibiting DNA methyltransferase activity.

12. A method of inhibiting proliferation of cancer cells comprising administering to a subject a synthetic inhibitor molecule which recognizes and binds an allosteric site on DCMTase thereby resulting in an enzyme/synthetic inhibitor molecule complex, the presence of the complex inhibiting DCMTase-mediated methylation of DNA, thereby inhibiting proliferation of the cancer cells.

13. The method of claim 12, wherein the cancer cell is from lung, breast, prostate, pancreas or colon.

14. The method of claim 11, wherein the synthetic inhibitor molecule is a synthetic oligonucleotide comprising a C-5 methylcytosine and which recognizes and binds

an allosteric site on DNA cytosine methyltransferase (DCMTase) thereby modulating DCMTase activity associated with the allosteric site.

15. The method of claim 12, wherein the subject is a human.

16. The method of claim 12, wherein the subject is an animal.

17. The method of claim 16, wherein the animal is porcine, piscine, avian, feline, equine, bovine, ovine, caprine or canine.

18. A method of identifying a molecule which recognizes and binds an allosteric site on DCMTase comprising:

(a) contacting a molecule with DCMTase in the presence of DNA and AdoMet;

(b) measuring DCMTase activity, an increase or decrease in DCMTase activity being indicative of a modulator of DCMTase; and

(c) determining whether the modulation of DCMTase activity is via binding an allosteric site on DCMTase.

19. The method of claim 18, wherein the modulator is an inhibitor.

20. The method of claim 18, wherein DCMTase activity is measured using a steady-state assay.

~~21.~~ The method of claim 12, wherein the synthetic inhibitor molecule comprises a C-5 methylcytosine.

22. The method of claim 12, wherein the synthetic inhibitor molecule is a synthetic oligonucleotide comprising a C-5 methylcytosine and which recognizes and binds an allosteric site on DNA cytosine methyltransferase (DCMTase) thereby modulating DCMTase activity associated with the allosteric site.

23. The method of claim 14, wherein the subject is a human.

24. The method of claim 14, wherein the subject is an animal.